DRAGON-FLIES

by

MARIE B. PABST
Raymond Foundation

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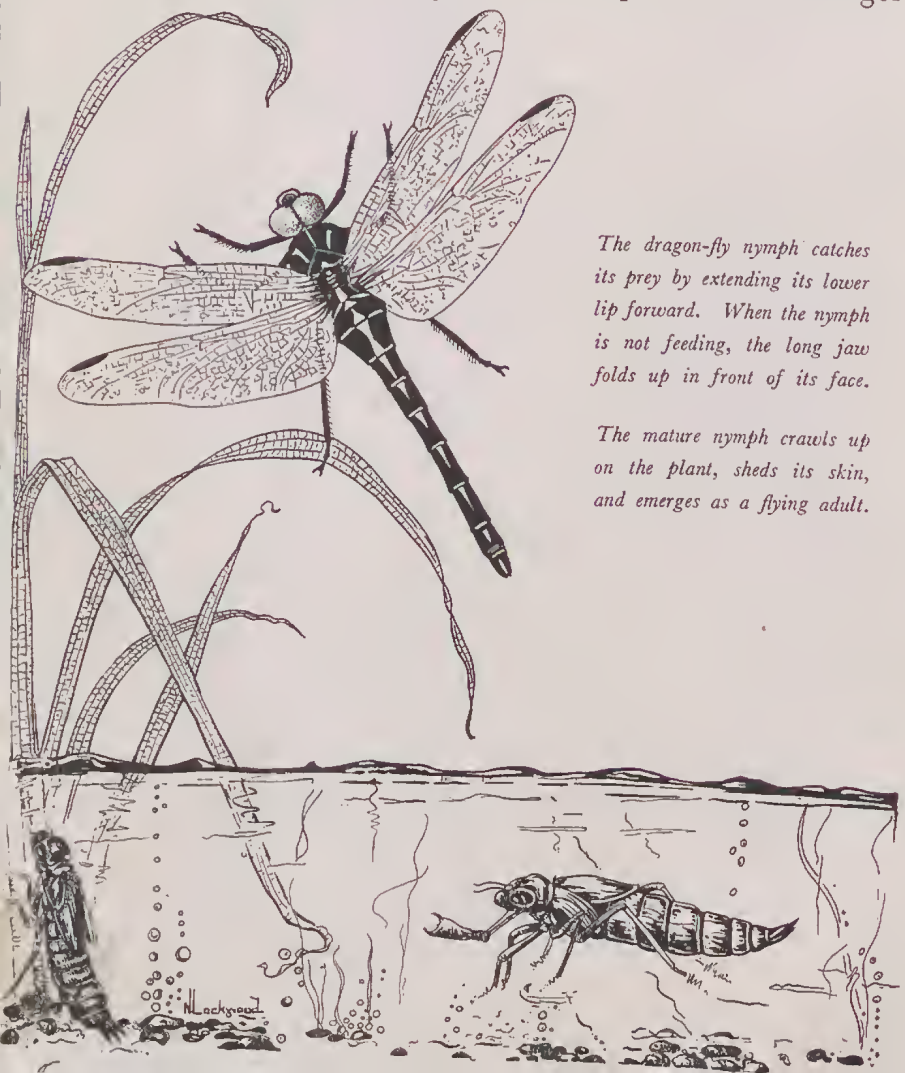
Dragon-Flies

A bright, shimmering dragon-fly is a beautiful object as it goes flitting over the water in the summer sunshine, or sits motionless upon a twig with its wings extended and its great eyes gleaming like gold. All dragon-flies, however, are not found near water; some prefer high, dry fields and others like the woods.

Dragon-flies were so named because of their big appetites and because they eat only living insects, which they pursue through the air. They capture their prey on the wing and feed upon almost all flying insects, especially gnats, midges and mosquitoes. The larger



The dragon-fly nymph catches its prey by extending its lower lip forward. When the nymph is not feeding, the long jaw folds up in front of its face.

The mature nymph crawls up on the plant, sheds its skin, and emerges as a flying adult.

dragon-flies eat house flies, wasps, and big butterflies. Many dragon-flies are superb flyers and can exceed even swallows in speed and agility. They can alter their direction of flight with perfect facility and unerringly capture their prey. One kind of dragon-fly has been known to travel nearly sixty miles an hour.

Like many birds and butterflies, some dragon-flies migrate in the autumn to warmer lands, and great swarms have frequently been seen many miles out at sea.

Dragon-flies possess five eyes. Three are simple, and two are compound. The compound eyes are groups of tiny lenses—28,000 in one eye. The upper lenses in the compound eye are larger and are probably used for flying in dim light or at dusk; the lower lenses are smaller and are probably used for flying in the daytime.

The mother dragon-fly lays her eggs directly in the water or fastens them to aquatic plants. The eggs hatch into "nymphs" (baby dragon-flies), which immediately swim off in search of something to eat. Dragon-fly nymphs are ogres of the ponds and streams, for they will attack creatures twice their own size. Their jaws and legs are very strong. They are not particular about their food and there is hardly one that will not devour with apparent relish the members of its own family.

The nymph usually moves by crawling, but it can swim by a curious method. Through the center of the body runs a tube that ends in five tightly fitting valves. When the insect wishes to swim, it fills the tube with water and then squirts out the contents forcibly. As a result, the whole body is sent forward.

Nymphs grow by molting (shedding the skin). They may have as many as seven new coats.

Dragon-flies are harmless to man and are of real value because the nymphs eat mosquito wrigglers in the water and the adults catch the mosquitoes they find hovering over the water.

This page is for your own notes and illustrations

THE MUSKRAT

by

GORDON S. PEARSALL
Raymond Foundation

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The Muskrat

Muskrats are usually found in the slow-moving water of swamps and marshes. The muskrat itself is not often seen, but its dome-shaped lodge in the swamps is a familiar sight to all naturalists. These lodges are found partieularly in regions of low-banked rivers, ponds,

Muskrat swimming toward its dome-shaped lodge.

and marshes, where rushes and reeds are growing; they are used espeeially in the winter but may be oeeupied for several years eontinuously.

When a new lodge is built, it is started in summer. The plaee seleeted is usually in rushes where the water is about two feet deep; the muskrats drag mud and vegetation to this spot and gradually build up a little island of rubbish. As the island is built higher and higher, less mud and more plants are used. When it is a few inehes above the water, a tunnel is dug under the mud island and up through it, just to the surfaee. There the tunnel is widened into a small ehamber or room. Every day a few more bundles of reeds and rushes are dragged onto the top until by August the pile is three or four feet high. If the roof of the ehamber beeomes too heavy and eaves in, material is torn off from the inside and padded onto the floor. Gradually, this room is enlarged, additional

entrances are dug and deepened, and finally the house is completed and ready for winter.

There is another type of muskrat house that is not as easily seen. When the muskrat lives in water bordered by high banks, it often digs into the bank and makes a burrow or tunnel. It may first dig an open canal across the bottom of the pond; then it burrows into the river bank below the water line. It gradually slopes the tunnel upward and forms a hollowed-out room or den well above the water line. The den has an opening in the surface of the bank, but this opening is carefully hidden by grass or sticks.

The muskrat does not often wander far from its lodge or den. Many muskrats build their lodges in the same swamp and thereby build up regular communities. In such regions, hundreds of muskrats, young and old, are found in one small area. They are wary and not often seen during the day, but on a moonlight night you are almost sure to see one swimming across the pond. Perhaps it will climb up on its favorite reed bed or log to eat a dinner of lily roots, reeds, flags or nearly any green thing in the pond. This vegetable food is varied with clams, mussels, and fish. Should an enemy appear, the muskrat will dive for safety.

Of its many enemies, the mink is the worst, for it lives in the same places and can follow the muskrat into its home, no matter how long or crooked is the underground trail to the door. From the air the muskrat is pursued by hawks and owls; in the water by pike and pickerel; and on land by weasels, foxes, wolves, and otters.

Man also pursues it, for this big water rat with the heavy body, short legs and flat scaly tail is one of the most valuable of our fur-bearing animals. The soft, woolly underfur is covered by coarser, rich brown fur that is often an inch or more in length.

This page is for your own notes and illustrations

THE PAINTED TURTLE

by

WINONA HINKLEY
Raymond Foundation

CHICAGO
NATURAL HISTORY
MUSEUM
RESEARCH EDUCATION
FOUNDED
1893
BY MARSHALL FIELD

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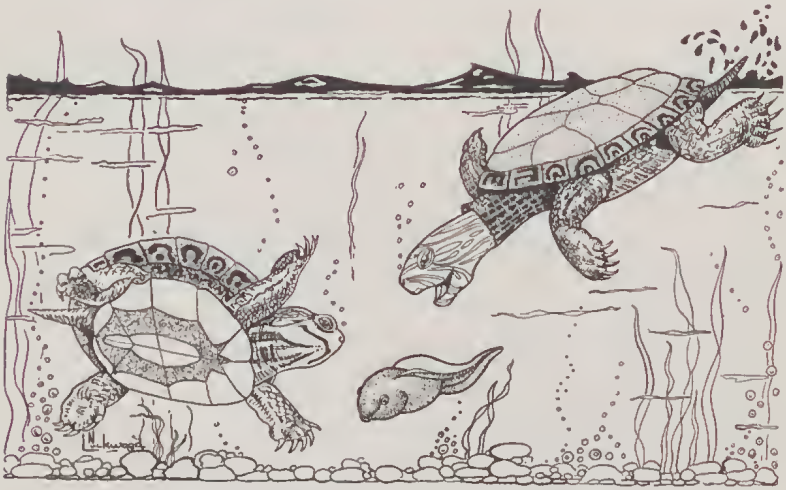
The Painted Turtle

If you hear a sudden splash at the pond's edge it may have been made by a painted turtle whose sunbath you have suddenly interrupted. If you watch closely it may appear, swimming along, its head looking much like



Painted turtles got their name because of the colorful red and yellow markings on the shell and body.

the end of a stick moving through the water. Perhaps its keen eyes are now searching for a tasty insect, or perhaps for a log on which it can continue to bask in the sun's warmth.

The mother turtle lays her eggs in the dry earth and several months later the little turtles are hatched. The first thing they do is to find their way to a nearby pond or stream. Even though the young ones may not see the water, they go directly toward it. How they know they are going in the right direction is something of a mystery to us. Perhaps they head away from trees and toward the most light, which is likely to be over water. The shell of one of these young turtles is relatively soft, and they make good meals for other animals. Even turtle eggs are not safe from raids by hungry enemies.

For food these turtles seem to like a variety of things. Some of the time they eat juicy water plants, and at other times they feed on animal life—crayfishes, clams, small fishes, insects, and worms. The painted turtle likes to eat under water. It swallows small food whole; it grasps larger pieces in its toothless jaws and tears them apart with its clawed feet.

As the soft body of the turtle grows its hard shell must grow also. The upper shell (the carapace), is made up of a number of small shields whose edges fit side by side. Every summer a new rim is added to each shield. In some turtles this makes it possible for us to tell how old they are. However, the shell surface of the painted turtle is shed from time to time, so we cannot determine its age that way. Perhaps it lives as long as we do.

When picked up, one of these shy turtles may wave its feet in the air. Or perhaps instead it will withdraw into the shell until all possible danger is past. As it pulls into its shell it exhales some of the air in order to make room for its head and legs. The hissing we hear is the air being forced out, for the turtle has no real voice.

Turtles are cold-blooded animals. This means that their bodies are only as warm as the air or water about them. Therefore, when the weather gets cold a turtle must go somewhere warm or it will freeze to death. In the fall the painted turtles crawl into the mud at the bottom of the pond, and there they stay until spring.

This page is for your own notes and illustrations

THE COMMON WATER SNAKE

by

WINONA HINKLEY
Raymond Foundation

Museum Stories, Number 143

March 22, 1947

The Common Water Snake

The logs and bushes along the edge of a pond or stream are the favorite haunts of the common water snake. Its mottled brown back helps conceal it as it lies in the sun. The dark crossbands on its neck are broken up into three rows of spots along its sides and back. It is difficult to see the pattern in an older water snake except when the skin is wet. There are several

At the slightest hint of danger the water snake will dive into the water and silently glide away.

kinds of water snakes in the Chicago area, but the common water snake is the largest. It may be from two to three feet long.

This snake is occasionally found some yards away from the water that is its home when it is not hibernating. In the water it is truly an agile creature. At the slightest hint of danger it will dive off a log, bush, or rock and silently glide away. A fish swims with the aid of its fins, and the other animals of the pond have feet to propel them. But the water snake can keep up with many of them by just weaving its body along in flowing waves.

The fishes and frogs and tadpoles of the pond are the main prey of the water snake. It chases its victims and seizes them in its jaws. Sometimes it will corner a fish and then writhe back and forth with open mouth waiting for the fish to become weary or misjudge its distance in a dash for freedom. The fishes which the

water snake feeds upon most are those which the fishermen do not want—the sucker and catfish especially. The snake swallows its prey whole, even the sharp-spined catfish. Sometimes after being swallowed the spines pierce clear through the snake's body and then drop off after the fish has been digested. Any wounds made from the spines quickly heal. From time to time the snake will venture on land and vary its diet with a mouse or shrew. The younger water snake feeds on insects before it is big enough to swallow these other animals.

Many boys have discovered that the water snake has an extremely bad temper. When cornered or handled it will put up a good fight, twisting and thrashing and lashing about, not hesitating to bite repeatedly with its many needle-like teeth. It also gives off a disagreeable odor when disturbed.

This snake is often called the water moccasin and some people fear it because they think it is the true water moccasin, a poisonous snake. The cottonmouth or true water moccasin is a larger and heavier snake that lives in the lowland areas of the southeastern part of the United States. Many of our water snakes have been slaughtered because they have been mistaken for these deadly snakes.

Often a water snake has a favorite place for basking and may even return to it year after year on sunny days. After a winter of hibernating in a deep retreat safe from the freezing weather, the water snakes appear in the early spring. In fact, they are among the first reptiles to come out in the spring and among the last to settle down in the late fall. Spending the winter months without food is no harder on a snake than it would be for us to miss two or three meals.

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THE BULLFROG

by

LORAIN FARMER
Raymond Foundation

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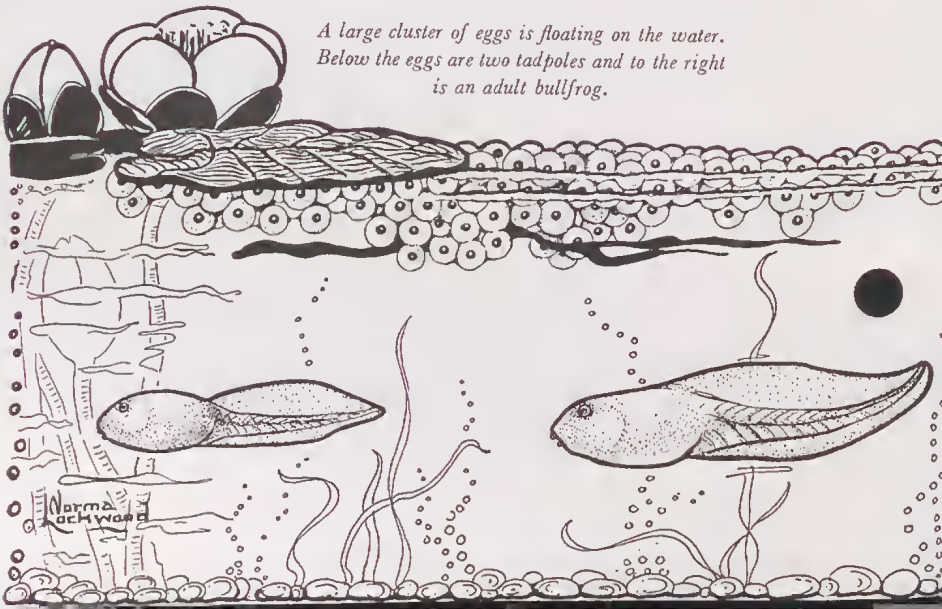
March 29, 1947

The Bullfrog

If you have ever visited a quiet, shady pond, you may have seen a bullfrog. Perhaps, even if you have never seen it, you may have heard its big bass voice in late June or early July. Sometimes the sound of a bullfrog chorus carries for several miles. But the bullfrog can make noises other than the deep "r-u-m" which you hear in the early summer. If you should come upon a bullfrog suddenly and frighten it as it basks in the sun, you might hear it give a sort of yelp as it dives into the water. It gives this yelp to warn other frogs. If it is hurt, it often gives an agonized cry that sounds like a human scream. This startles the enemy so that the bullfrog will be released.

Although this frog is an expert at diving, jumping and swimming, another of its tricks for escaping danger is not as effective. It will often bury its head and body in the mud, but leave its long legs in full view.

The female bullfrog spreads a large, flat cluster of eggs on the water late in June. There may be from ten to twenty thousand eggs in the mass laid by one bullfrog. The animals that hatch from these tiny eggs are called tadpoles. They do not look at all like fullgrown bull-



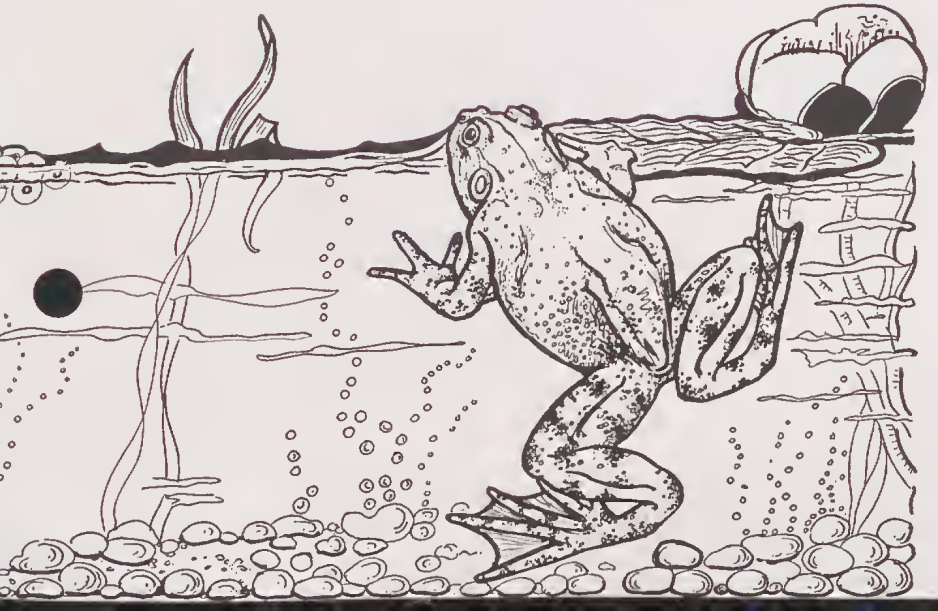
A large cluster of eggs is floating on the water. Below the eggs are two tadpoles and to the right is an adult bullfrog.

frogs. If you watch them, you can see that they have no legs, and breathe with gills instead of lungs. When the tadpoles are very young, these gills are on the outside of their bodies. As they grow older, however, the gills change position until they are on the inside of the body.

These tadpoles swim about in search of small plants and animals to eat. Although they grow larger, they do not become frogs for a long time. It is not until their second or third summer that their tails disappear, their lungs and legs develop, and they are ready to try living on dry land.

Bullfrogs are very greedy. They will eat just about any animal that they can overpower. They have even been known to eat small birds and mice. However, their main diet seems to consist of small frogs and cray-fish. Large bullfrogs sometimes eat animals which weigh one third as much as they do. Can you imagine yourself swallowing a large Thanksgiving turkey?

As a bullfrog swallows its prey, it shuts its eyes tightly as you sometimes do when you have to swallow a big pill. When the bullfrog's eyelids are closed, its eyeballs push back into the roof of its mouth and this action helps it to swallow the food.



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THE GREAT BLUE HERON

by

WINONA HINKLEY
Raymond Foundation

Museum Stories, Number 145

April 5, 1947

The Great Blue Heron

The giant of our rivers and open shallow ponds stands four feet high, and in flight it may be six feet between wing tips. When you see its long legs, long neck, and strong beak, you know that the great blue heron is a water bird.

For what seems like hours at a time the great blue heron will stand on one leg while the other is drawn up under the feathers of the body. All this time the heron appears to be looking off into space. Actually, though, its eyes bulge so much that without moving its head the heron is peering down into the water at its feet. Any luckless fish or frog that chances by will be quickly snapped up in the bird's long, powerful beak. If the prey is small the heron may toss it into the air and catch it headfirst with open mouth. A dragon-fly darting too near the head of the motionless bird will share a similar fate. When making a catch the bird scarcely needs to shift its position, and often right after swallowing a meal it seems as composed as ever.

Much food must be brought back to the young in the nest high in a nearby tree. The very young birds will receive food regurgitated from the parent's throat. In order to get this soft, partially digested food the young bird will take the parent's beak crosswise in its own. After quite a tussle the food either gets to its destination or drops into the nest. As the birds grow older the parents will bring back whole fish for the nest-bound youngsters. When the babies are alone in the nest they usually lie quietly, but as soon as a parent is seen or heard returning they become very excited, eagerly begging for food.

Young great blue herons have soft down feathers. They are far from attractive until the down patches are replaced with the bluish-gray flight feathers in a few months. When first hatched from the egg a heron is

helpless. Later it becomes ungainly and pugnacious. Usually the young remain in the nest until they are as large as their parents. Sometimes if frightened a young bird will climb awkwardly over the nearby branches and perhaps fall to the ground or water below. If it falls, the bird may starve, as the parents probably will not try to feed it.

Their nest in the top branches of a tall tree is a mass of sticks and is lined with green twigs. It may be one of last year's nests which has been strengthened and remodeled. There should be many others nearby. Probably some of these will be in the same tree, for the great blue herons are sociable birds.

The grove of trees with these nests is called a rookery. The rookery is an interesting place to visit. Overhead the constant activity and chattering increase to great proportions at feeding time. The young scrambling about in the nests, the flapping of the adults' great powerful wings, and the series of three or four low hoarse "quonks" uttered by the parents on approaching and leaving the nests contribute to the restless atmosphere of the rookery.

Two or three powerful strokes of the wings lift the great blue heron into the air. In full flight the legs are extended back and the neck is pulled in.

This page is for your own notes and illustrations

A COMMON CRAYFISH

by

LORAIN FARMER
Raymond Foundation

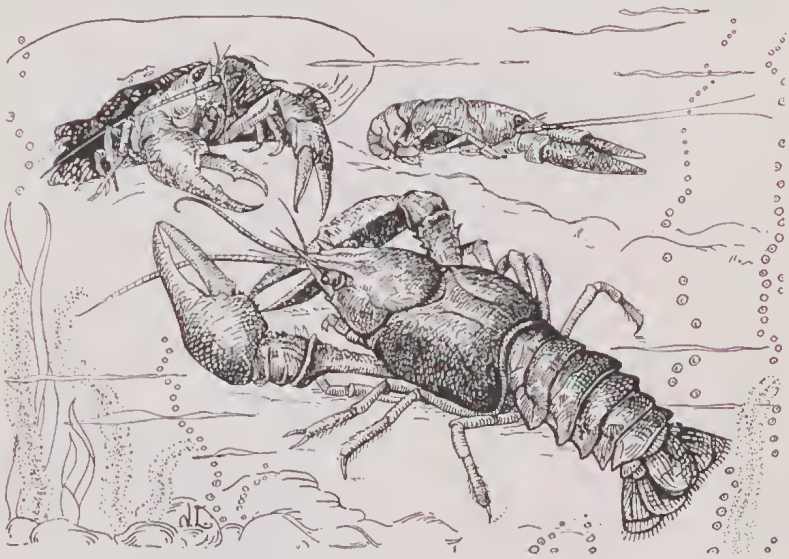
Museum Stories, Number 146

April 12, 1947

A Common Crayfish

Among the dead leaves and sticks at the bottom of a pond, lives a crayfish that is common in the midwest. During the daytime, you will probably find the crayfish in the entrance to its hole, for it emerges only at night when it goes hunting for food.

The eyes of the crayfish are each placed at the tip of a movable stalk on its head. When the crayfish



A common crayfish of our midwestern streams and ponds. It lives at the bottom among dead leaves and sticks, usually emerging from its hole only at night.

wishes to change the direction of its vision, it simply moves the stalks. While watching for its enemies, with one eye, it can keep track of a small water insect with the other. These large black eyes are not built like ours. They are called compound eyes, which means that each large eye is made up of many hundreds of small ones. The crayfish is able to see moving objects with these strange eyes, but apparently it cannot see sharp pictures as we do.

A crayfish eats mostly dead animal matter, but it will not pass by a small fish or tadpole. The crayfish

seizes its food with its two large claws and tears it to pieces. Then, using its several pairs of "jaw-legs" as knives and forks, it passes the food down to its mouth.

On its way to or from meals, the crayfish seems to glide effortlessly over the bottom of the pond, using its four pairs of walking legs and its "swimmerets." The swimmerets are little legs shaped somewhat like the oars on a boat. If, however, the crayfish is surprised, it will make its escape by shooting itself suddenly backward through the water by means of its tail.

The mother crayfish uses her swimmerets in another way. In the spring, when she is ready to lay her eggs, she carefully cleans the swimmerets. Then, using her hind legs, she covers them with a sticky substance and fastens her eggs to them in grape-like clusters. In this way, she carries the eggs about with her until they hatch. Even after the eggs have hatched, the little crayfishes cling to the mother's swimmerets for a short time until they are able to take care of themselves.

If you take a crayfish out of the water, it will sit back, brandishing its big claws and waving its feelers frantically. The two feelers, or antennae, are used by the crayfish to explore the area around it as we feel objects with our fingers in order to examine them.

The crayfish wears its skeleton on the outside of its body. Perhaps this seems strange to you, but it is very convenient for the crayfish. This skeleton, or shell, serves as a suit of armor. The crayfish outgrows this skeleton several times during its life. Since the skeleton is stiff and will not stretch, it must be shed so that the crayfish can grow. When the skeleton gets too tight, it splits down the back, and the crayfish pulls its entire body out, even its claws and eyes. Then the crayfish is very helpless for its new shell is still soft and is no protection. Soon, however, the new shell hardens, and again shields the crayfish from its enemies.

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A FRESH WATER SNAIL

by

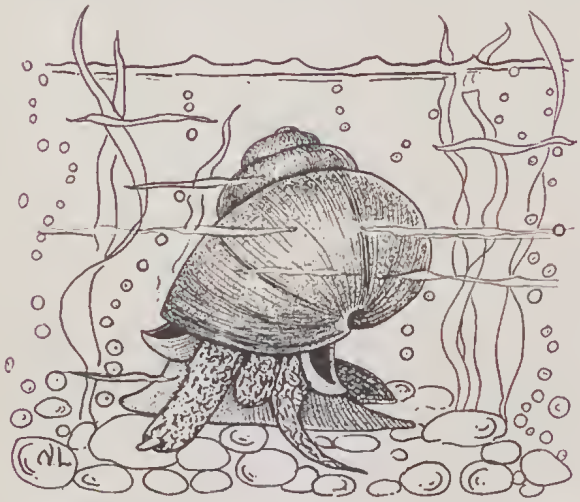
LORAIN FARMER
Raymond Foundation

Museum Stories, Number 147

April 19, 1947

A Fresh Water Snail

Have you ever seen an animal that has only one foot? Probably you have, for an animal that is said to have a single foot is often found in fresh water aquaria, and can be seen in many of the ponds in the Chicago region.



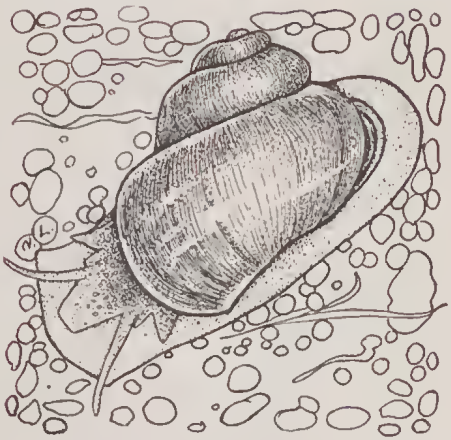
The fresh water snail is covered with a green, spiral-shaped shell, its only means of defense.

This animal is the fresh water snail. You should remember, however, that the "foot" of a snail is really not a foot at all, although the snail uses it in movement.

There are many different kinds of fresh water snails. One of these is called the viviparous pond snail. It is called viviparous because it does not lay eggs as some other snails do; the baby snails are born alive. These tiny snails are just like the grown ones except that they are smaller and have fewer coils. The adult snail is large and its shell has a greenish color. This shell is very important to the snail for, since it moves rather slowly, it has no other means of defense against its enemies. If you should frighten it you would probably see it draw in its head and foot and quickly close the opening of its shell with a horny plate called the operculum. The word "operculum" means cover, and the snail's operculum serves as a trap door with which it

can shut itself in the shell. The body of the snail is the same shape as its shell, as can be seen if the shell is removed. Remember, however, that if the shell is taken off the snail will die.

Perhaps you have noticed the greenish film that frequently covers the glass of an aquarium. This film is made up of tiny plants that grow on the sides of the aquarium and provide the snails with food. Sometimes as the snail crawls slowly along the glass, it leaves a clear path behind it for it devours the tiny plants as it goes along. If you watch it closely you can see how it eats. On the under side of its head there is a small mouth, which opens and closes as the snail makes its way over the glass. Each time the mouth opens, a file-like tongue is thrust out. This tongue has on it many small



The fresh water snail glides smoothly and easily along on its one "foot." This foot is usually drawn into the shell if the snail sees an enemy approaching.

teeth that are used to rasp off pieces of food. When the teeth become worn down at the tip, they are replaced by others in much the same way that our fingernails become worn and grow out again.

Although viviparous pond snails spend much time crawling along the glass in the aquarium, you will never find them out of the water for they get the oxygen they need from the water by means of their gills.

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LIFE IN A DROP OF POND WATER

by

WINONA HINKLEY
Raymond Foundation

Museum Stories, Number 148

April 26, 1947

Life in a Drop of Pond Water

In every drop of pond water there live many plants and animals so small that they remain unseen until we look at them through a microscope.

Ponds harbor millions of minute golden-brown plants known as "diatoms." Billions cover the pond floor and the stems of submerged plants, and hundreds of them hang on the hairs of most water insects. Beautiful objects of many shapes, they have glassy shells which are transparent, colorless and finely lined.

Another group of delicate plants in which there are many patterns and sizes is the "desmids." In shapes of crescents, stars, triangles, and many others, they grow in clear sunlit pond water. Where many are growing the water is bright green.

The familiar scum, "spirogyra," found on the surface of still water examined under a microscope, proves to be made up of long threadlike filaments. This is not the only plant that may produce a green scum on fresh water, but it can usually be distinguished by a soapy feeling. It may seem slimy, but it is really a beautiful plant, as you would agree after seeing it magnified.

These microscopic plants of the pond are so extensive that for the water animals they are a food crop

From top to bottom: Spirogyra, rotifer, amoeba, waterflea, desmids, Cyclops, diatoms, and rotifer.

fully as important as grass is for land animals. The tiniest animals depend on these plants and they in turn are food for animals not much larger than themselves and they for those still larger.

The smallest and simplest creatures in the animal kingdom would not look like animals to you, for they have no head, arms, legs, or other parts present in animals you know. One of these, the amoeba, looks (through a microscope) like a tiny dab of almost colorless jelly. It may extend a part of its body into a rather shapeless projection which will eventually be drawn back into the body again. When the amoeba eats, it simply wraps these projections around the bit of food. Relatives of the amoeba have queer shapes for animals—some remind us of flowers, some of bells, and some of pancakes.

Some of the prettiest objects of the microscopic world are the animals known as the "rotifers" or "wheel-bearers." The "wheel" that gives these creatures their name is really a rapidly moving circular row of whip-like hairs around the mouth. It helps direct particles of food into the rotifer's mouth. It also acts like the propeller of a motor boat in propelling the animal through the water.

One can hardly put a drop of pond water under the microscope without seeing some of the tiniest relatives of our crayfish. Even with your naked eye you can see some of these almost transparent little animals in the water. With a microscope it is not difficult to recognize different kinds, the water flea, fairy shrimp, and others.

A very common one is called "Cyclops." It is seen as a little dot jerking through the water. Some are white, some red, some blue. A single eye in the middle of its head gives it the name of the one-eyed giant of Greek mythology.

All these and thousands more are just waiting for you to discover them.

This page is for your own notes and illustrations